Surface Alerting
and
Runway Incursion Prevention

Background

- GIBS
- ADS-B MASPS Development
- DO-242 App. E
- SC-193 Mapping Requirements
- Runway Incursion “safety” Issues
- Surface Management Issues
- Related SC-186 Issue Papers

Based on Analyzed References

- ADS-B MASPS (App E)
- Class A runway incursions 1997-2000
- Accident Reports NTSB
- CPDLC NASA Runway Incursion Prevention Brief
- FAA Order 7110.118 (LAHSO)
- NASA RIPS Program
- Operator Interviews

KEY ASSUMPTIONS

- ADS-B data link assumed
- Moving map utilized on CDTI / MFD
- There are onboard relevant data bases
  - Runway safety areas are included in data bases
- TIS-B data link is value added
  - Common denominator (AC , vehicles and fixed points)
- Variable data rates are feasible
- Single message has multi link functionality

Supported Applications

- Appendix E--Airport Surface Domain
  - Surface situational awareness
    - Aircraft
    - Vehicles
    - controllers
  - Conflict management
  - Runway incursion prevention
    - Monitoring
    - Alerting
  - Crash rescue (ARFF)
  - ELT and ADS-B functionality
    - Emergency priority
    - Special handling

Supported Applications

- Airline/Airport surface asset management
- LAHSO
- Broadcast of monitored frequencies
- On/Off Airport noise monitoring
- Surface jet blast avoidance
- Off runway surface movement
- De-ice operations

Objectives

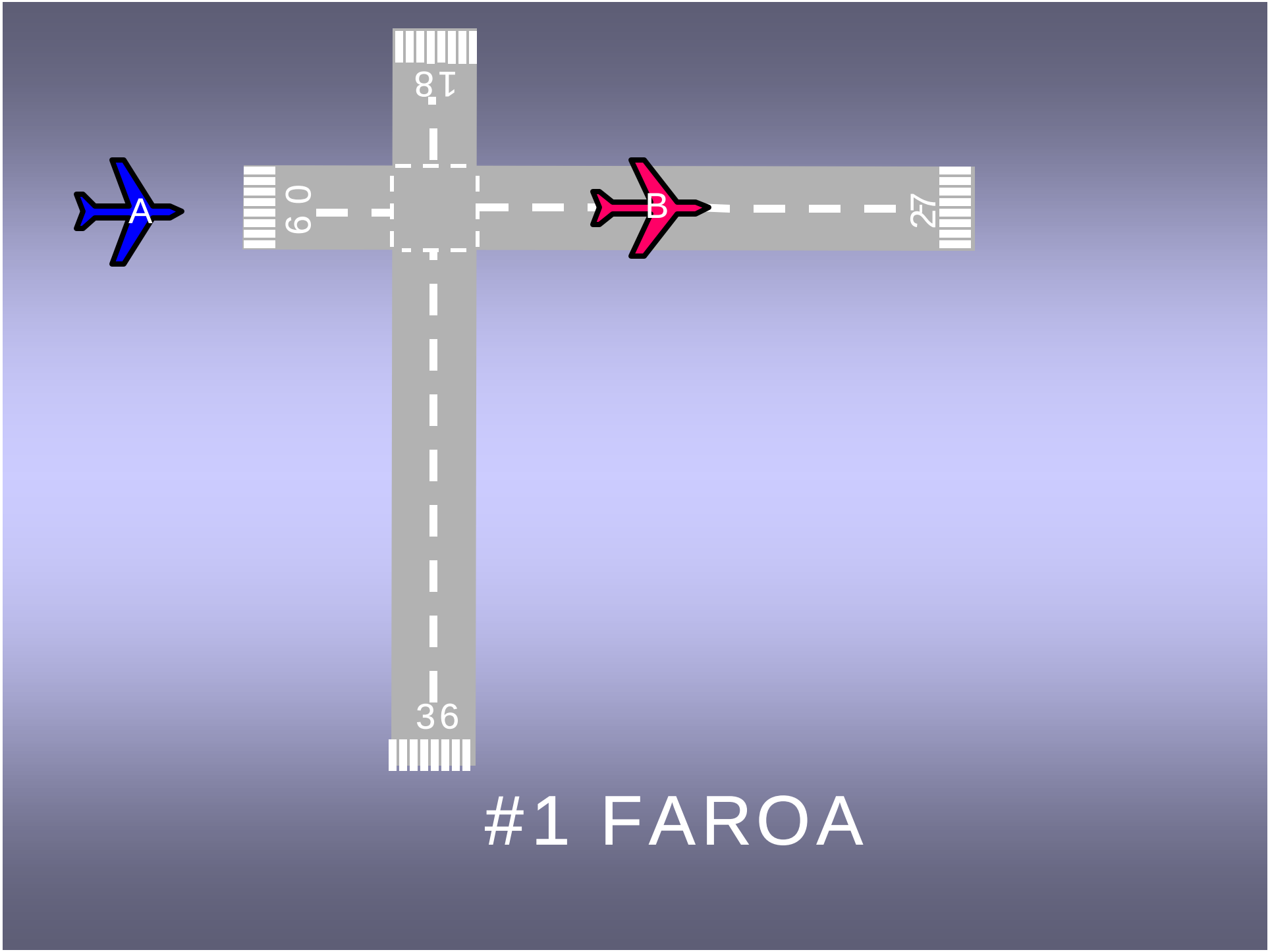
- To develop ADS-B?TIS-B message sets that could enhance airport safety with a focus on “Runway Incursions” and similar incidents involving aircraft and vehicles on the airport surface—to include both, towered and non-towered airports

Rationale for Alerting

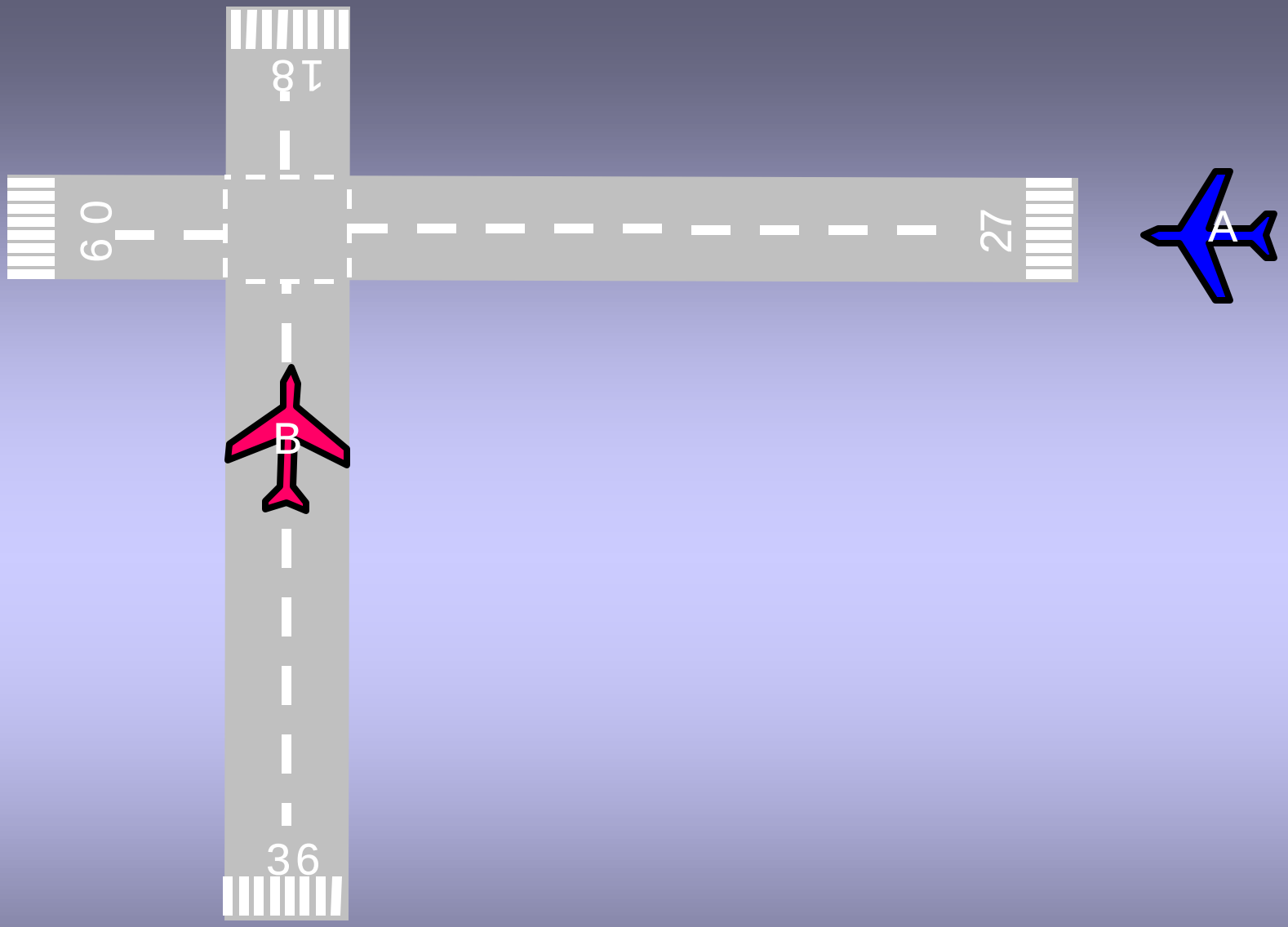
- Systematic analysis of 55 Class A runway incursion incidents indicated lack of awareness by crews
- Several Surface Accidents
- Majority were due to lost awareness
- One included Student Pilot
- Aircraft movement in proximity to others a factor

Alerts and Warnings

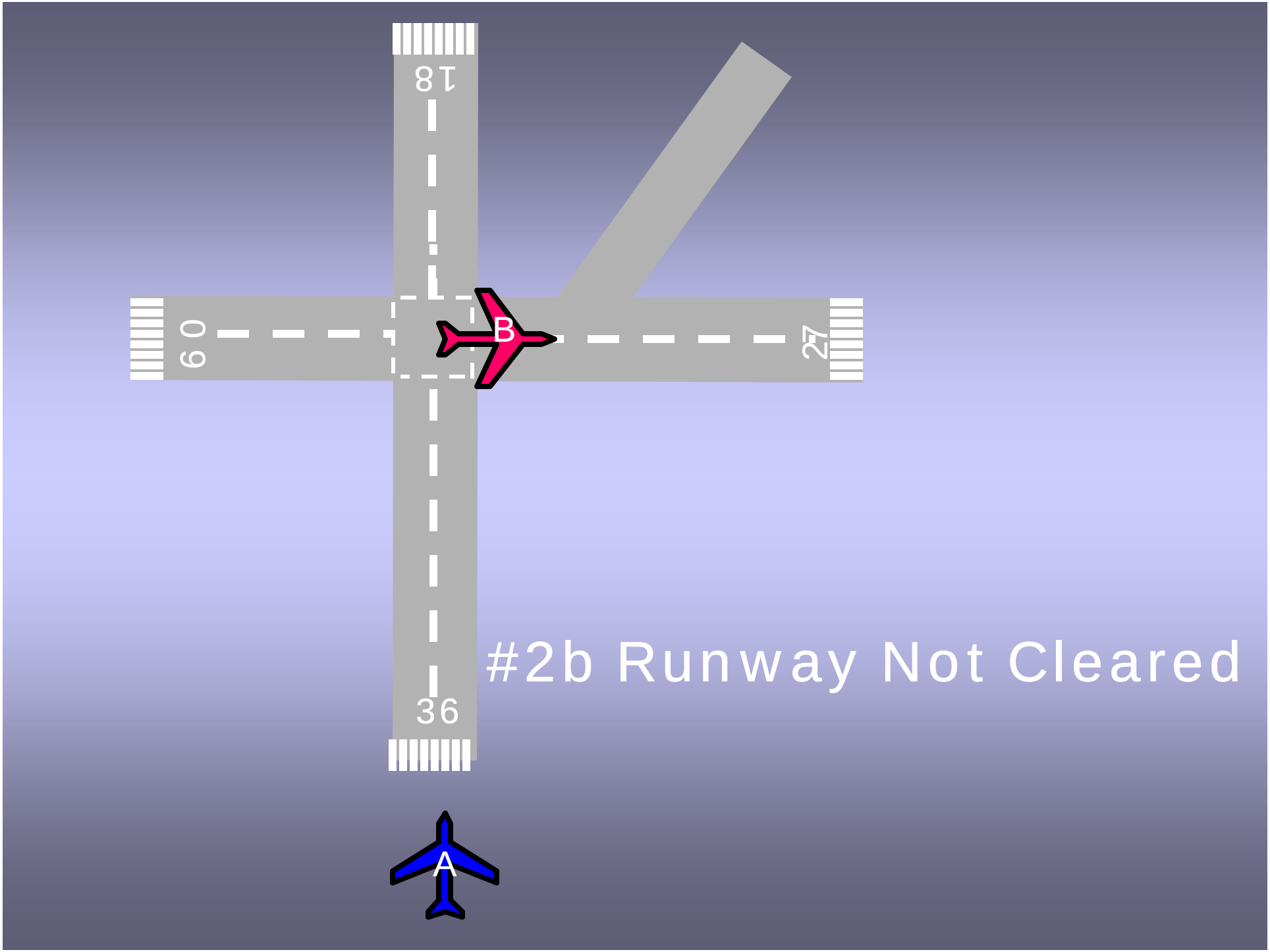
- Advisory
- Caution
- Warning
- Time Critical Warning
  - Pilot reaction required immediately to avert situation

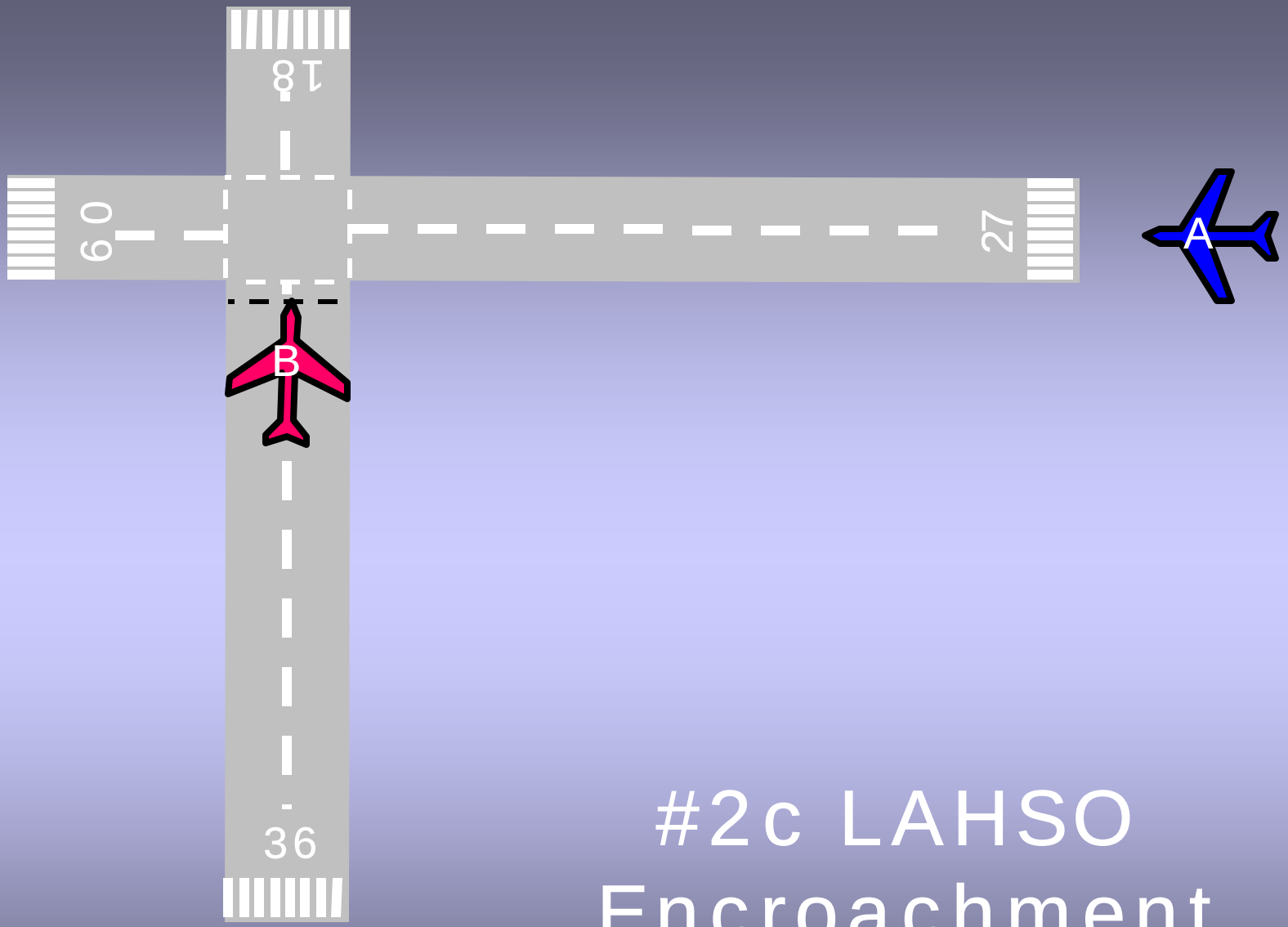


#1 FAROA

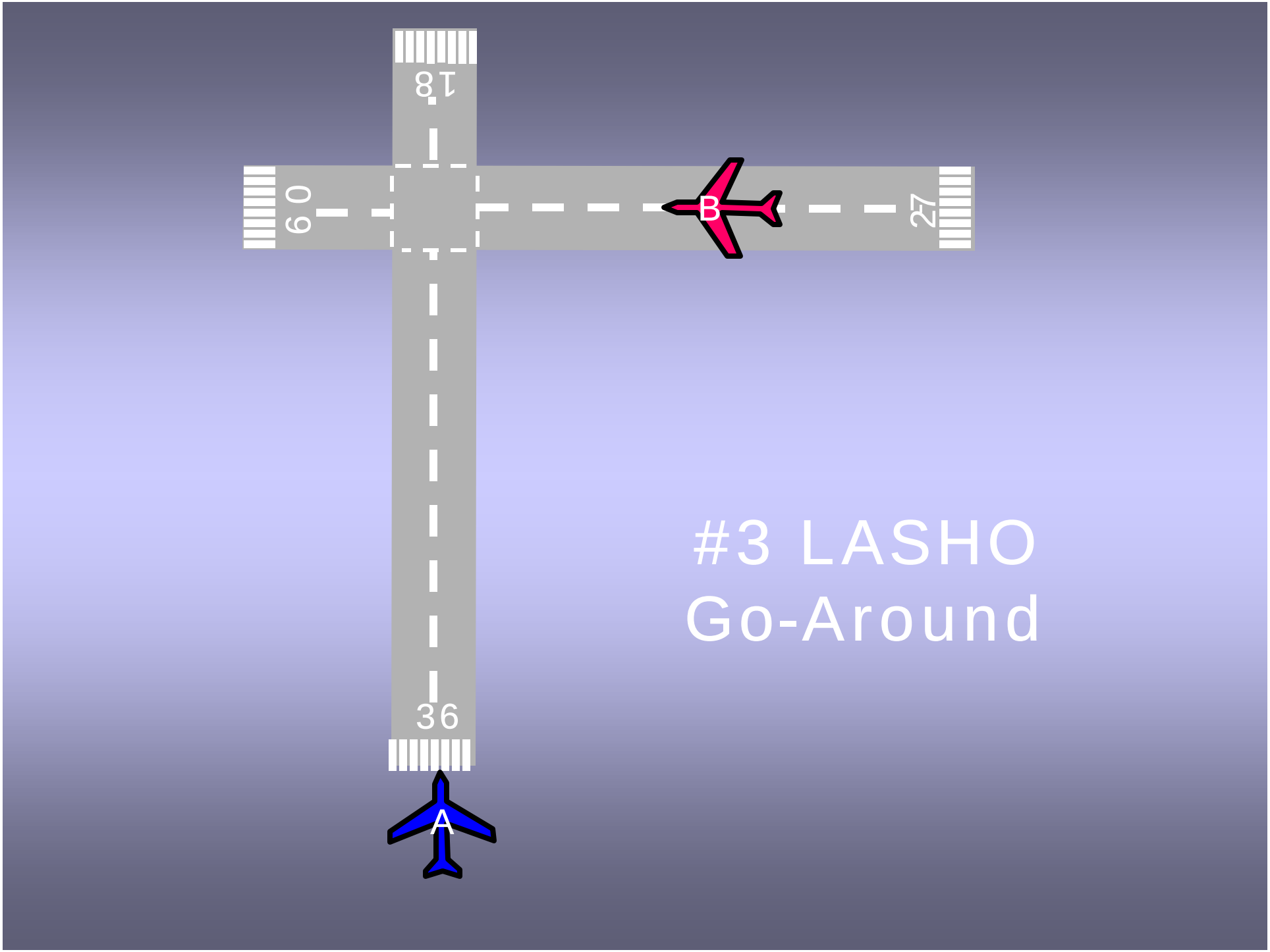


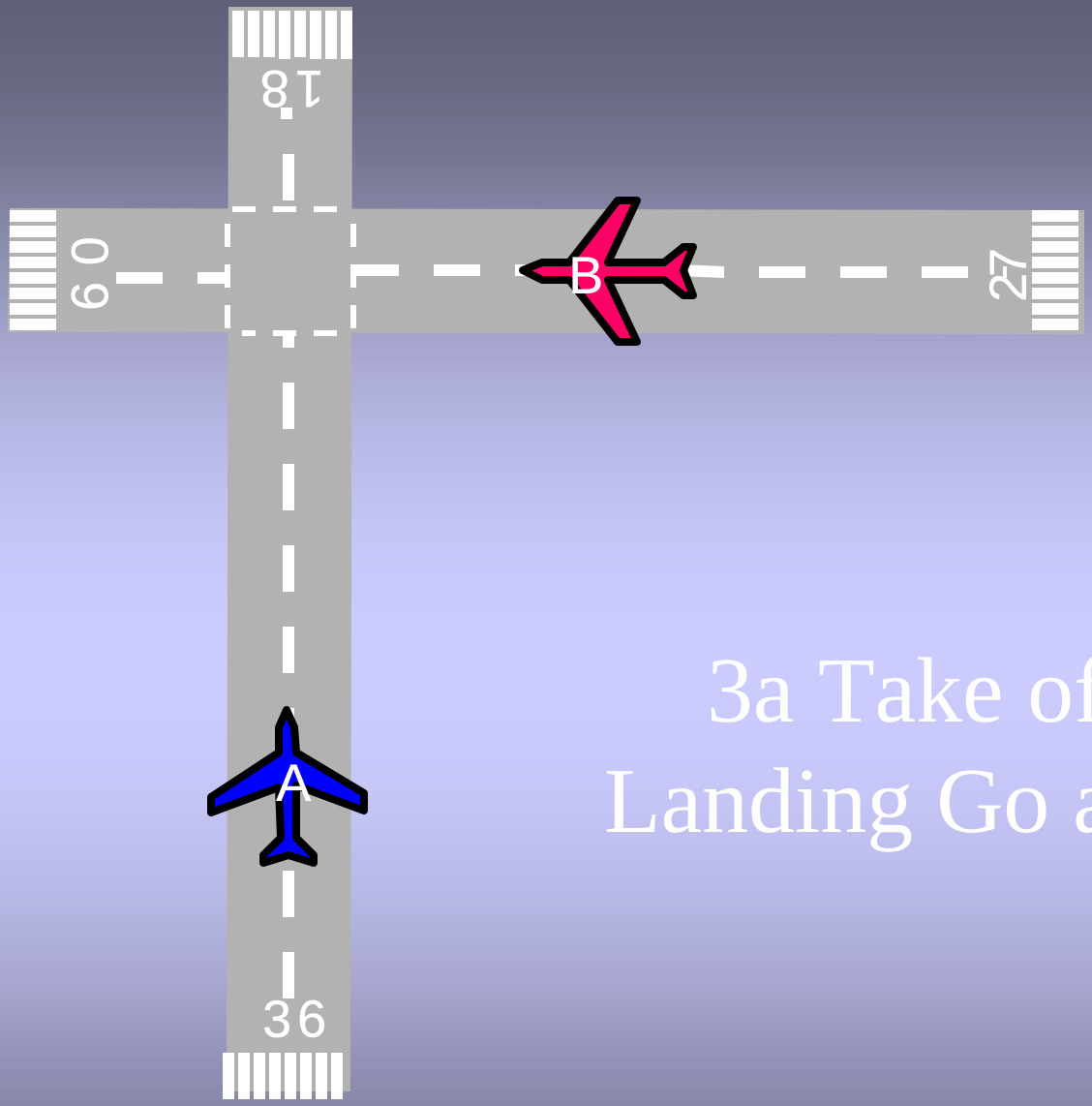
#2 Intersecting Runways


18
09
27
36
B
A
#2b Runway Not Cleared

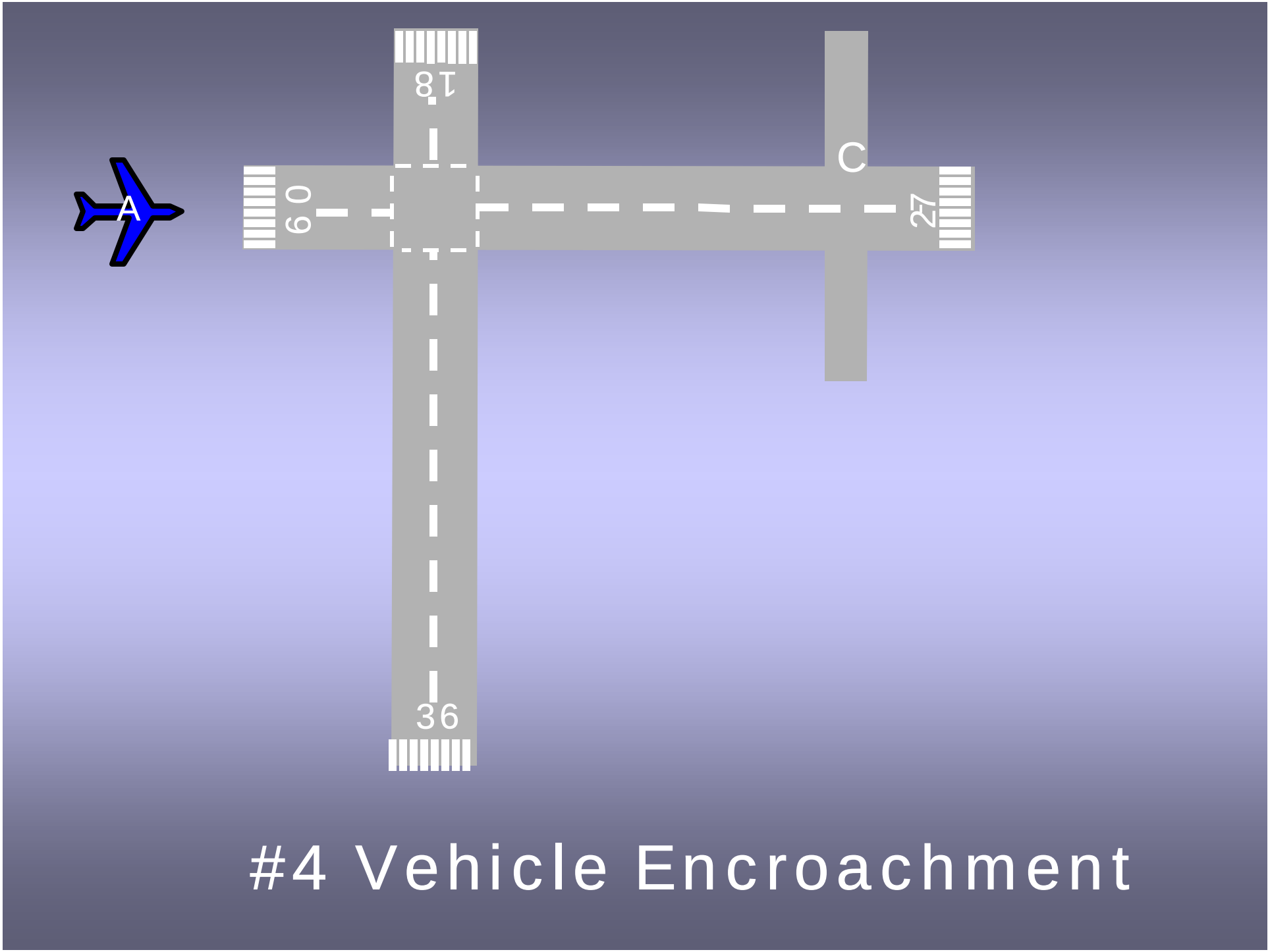


#2c LAHSO Encroachment

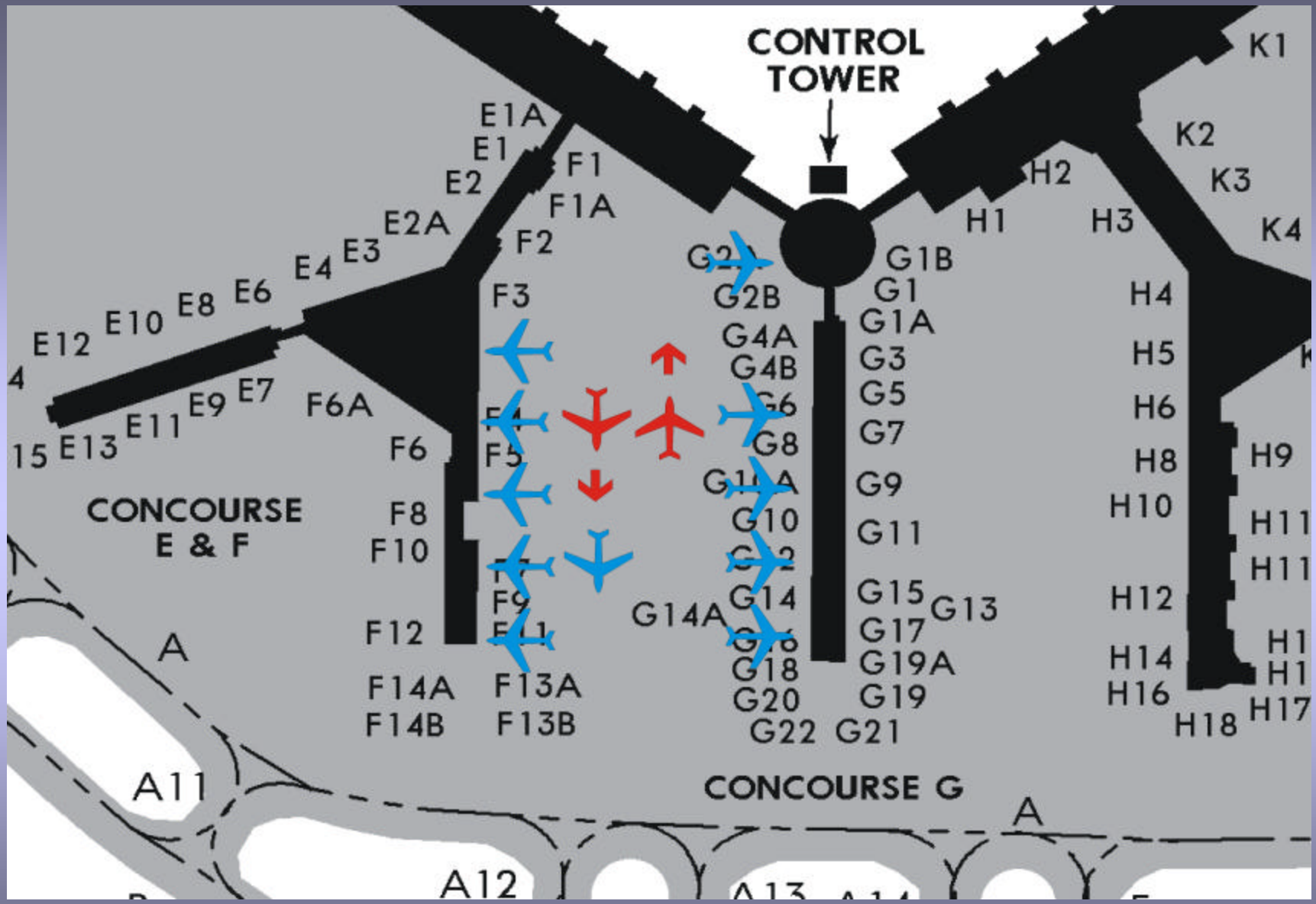

18
09
27
36
B
A
#3 LASHO
Go-Around



3a Take off & Landing Go around



#4 Vehicle Encroachment



5 Taxiway Areas

RECOMMENDED MESSAGE SET ELEMENTS			
STATE	BROADCAST RATE	SCENARIO APPLICATION	LINK
MAKE AND MODEL	?	1, 2, 2b, 2c, 3, 3a, 5	ADS-B / TIS-B
BRAKES ON/OFF	?	1,2,2c,3	ADS-B / TIS-B
% POWER	?	1,2,2c,3,3a	ADS-B
LIGHTS ON/OFF	?	1,2,2c,3	ADS-B
COM. FREQ	?	1,2,2b,2c,3,3a	ADS-B
SOULS/FUEL	?	1,2,2b,2c,3,4,5	ADS-B / TIS-B
HEADING	?	1,2,2b,2c,3,3a,5	ADS-B / TIS-B
NAV. CENTER	?	All	ADS-B / TIS-B
AIRBORNE STATUS	?	1,2,2c,3,3a	ADS-B / TIS-B
NIC--NAC	?	All	ADS-B

Related Observations

- LAHSO
  - Bulls eye?
  - Own ship hold short state?
- Spacing for intersecting runway missed approaches?
- Tire Predictors?
- Human Factors for Iconology?

Summary
Recommended Actions

- AdHoc Group reach consensus on
  - Applications
  - Priorities
  - Elements
  - Minimum data rates
- Feasible Applications be included in current MASPS revision